

# PAPER TECHNOLOGY IN MEDIEVAL INDIA

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The paper gives a brief development of paper industry in India. It describes the method of manufacturing paper, the various centres established in the country and specialities of different types of papers made in different parts of the country. The manufactured paper was known after the place of the manufacture or after the names of the patrons under whose patronage or supervision the paper was being made. There was considerable difference in the qualities of paper made in different areas which were used for different purposes.

Before the advent of papermaking industry in India the writing materials which were extensively used were the bark and leaves of trees (*tvak* and *patra*), cloth-silk or cotton (*pāṭa*), plank (*phalaka*), leather and parchment, metal, particularly copper (*tāmrāpatta*), clay-tablets and rock (*śīlā*). Specimens of old documents on all these materials are extant. It is not as if edicts, inscriptions and grants alone have come down to us on rocks and copperplates, e.g. rock edicts of Ashoka and the grants of Valabhi rulers inscribed on copperplates, even literary works—plays (e.g., *Pārijātamañjari*), poems (*Kūrmāsataka*, *Hanumadiniśati*) and music and songs (*Kudumiyamalai*, *Tallapakkam* compositions) are extant on stone and copperplates. The renowned Arab bibliographer, Ibn Nadīm (d. A.D. 995), states:

‘The Arabs write on the shoulder bones of camels and on the leaves of date-palm . . . whereas the Indians use copperplates, rocks and white silk.’<sup>1</sup>

But by and large ancient Indian literature has been preserved on leaves—palm-leaves (the short and stiff variety which is more common, and the broader and more flexible *śritāla*) in the southern parts of India, while birch (*bhūrjapatra*) was used in Kashmir and the northern regions of the country. The palm-leaf (*tālapatra*) in its shorter and thicker variety which is the normal one and in its broader and more pliable variety *śritāla* is by far the most common material in which the bulk of old Indian literature in Sanskrit, Prakrit, Telugu, etc., has been preserved all over India. In Andhra Pradesh, South India, the Andhra Historical Research Society alone maintains an Oriental MSS. library of 1,000 palm-leaf books in Sanskrit, Telugu, etc. Kalidas refers to the birch bark as a writing material. Greek testimony, of

Neorchos and Curtis, also bears out the use in India in the fourth century B.C. of cloth and the inner bark of the Himalayan birch. Giving a description of the province of Orissa Sujan Rai states:

‘The people of that province would scribe on palm-leaves by an iron pen which they held in their fists and would sparingly use the birch and ink.’<sup>2</sup>

The same historian writing about Kashmir states:

‘There the people scribe mostly on the inner bark of *bhūrjapatra* which grows in abundance in this country. The ink is so prepared that it cannot be blotted out by washing.’<sup>3</sup>

State documents were also written on cloth—cotton and silk (*pāṭa*). Till very recently, in the Kannada region, the material commonly used and called *kaḍitam* was made of cotton pieces stiffened by coating of a dark paste and written over with chalk (*kathini*) or steatite pencil. Examples of this could be seen in South Indian MSS. libraries. Again, wooden boards (*phalaka*) and bamboo have also been pressed into service. Despite the keen sense of purity and pollution, ancient India did use to some extent leather on which some documents have been discovered. Strabo refers to the use in India of parchment for State documents. Like palm-leaf, metal plates, particularly of copper (*tāmrapatta*), were extensively used to record State edicts, grants and also literary works. The most remarkable literary records on copperplates are represented by a large number of these preserved in the Tirupati Temple, carrying the entire volume of the musical compositions of *Tallapakkam* composers of the Tirupati shrine. Stone and sides of rocks were freely used to record royal exploits and grants. There is hardly a cave temple or built temple in India which is not an imperishable library of this type of written material. We have even a couple of dramas preserved in stone inscriptions, the *Harakeli* and the *Lalitaviṅgraharāja Nāṭakas* of the twelfth century. Some centuries before this the Pallavas left at Kudumiamalai near Pudukottah a music treatise on the rock. It was after all these materials had been tried that actual paper came to be handled. The Chinese are generally credited with the discovery of making paper although it is highly probable that, through draining natural deposits on the sides of pools, paper may have been discovered independently by other peoples such as the Aztecs and the Maoris, etc. From China the knowledge of papermaking reached Korea (c. A.D. 610) and Japan (c. A.D. 625). It was the Chinese prisoners of war, brought to Samarqand after the battle of Atakh near Talas, that first introduced in A.D. 751 the industry of papermaking from linen, flax or hemp rags, after the method used in China. Ibn Nadīm observes in *al-Fihrist*:

‘The Chinese write on the Chinese paper made from a sort of herbage. This (industry) is a great source of income for the city.’<sup>4</sup>

The Arabs learned the technique of papermaking from Chinese captives at Samarqand and diffused it westwards. Al-Berunī states:

‘Paper was invented by the Chinese. The Chinese captives introduced it in Samarqand whence it diffused to other parts of the world.’<sup>5</sup>

Paper-mills were eventually erected at various centres, those at Samarqand and Khurāsān being among the first. The Arabs improved upon the technique and supplemented flax and other vegetable fibres with linen. With the conquest of Sind by the Arabs Khurāsānī paper was first introduced into India early in the eighth century A.D. and continued to be imported even afterwards for several centuries.

Shams Siraj‘Afif in *Tārīkh-i Fīrozshāhī* has stated that scholars, poets and artisans were attracted to the courts of Sultan Muhammad b. Tughlaq and Firoz Tughlaq. The latter particularly received them with royal patronage and caused several new industries to be introduced in India. By this time paper had assumed great importance as a writing material and it is very likely that paper-mills should have also been erected by him. That a modest beginning had already been made in that direction is amply borne by the testimony of a contemporary historian, Abū Ḥāmid al-Gḥarnāṭī, who states:

‘The Samarqandi paper supplanted the Egyptian paper just as the latter had excelled the Maghribī paper. The paper made at Balkh favourably compared to that of Iraq, Khurāsān and India.’<sup>6</sup>

The reference to Indian paper suggests that the papermaking industry, however limited, had already been established in India most probably at Delhi and Lahore, the two chief political and cultural seats of the Sultanate period.

It is not until the reign of Sultan Zainu‘l-‘Abidin of Kashmir (A.D. 1417-1467) that the first pointed reference to the establishment of paper industry in this country is found in the chronicles. His father, Sultan Sikandar (c. 1386-1410), was ruling over Kashmir at the time of Timur’s invasion of India (A.D. 1398). Sultan Sikandar sent an embassy, led by his son, Shāhī Khān, to that formidable personage and sought his friendship. Timur summoned him to meet him but in the meanwhile political developments at home compelled him to leave India. He hastened to Samarqand but took Shāhī Khān with him to that place where he kept him virtually as a hostage till his death. Shāhī Khān, later known as Sultan Zainu‘l-‘Abidin, utilized his sojourn at Samarqand in the pursuit of knowledge. When he returned to Kashmir he brought with him many artisans and persons skilled in various trades with a view to introducing new industries in Kashmir. These persons included

papermakers, bookbinders harnessmakers and midwives. According to the author of *Tārīkh-i Kashmīr* :

‘During his stay at Samarqand he acquired knowledge. When he returned to Kashmir he brought with him a number of artisans skilled in different trades such as papermakers, bookbinders, carpetmakers harnessmakers and well-trained midwives.’<sup>7</sup>

His enthusiasm for the welfare and progress of Kashmir did not diminish even after ascending the throne. The same author states elsewhere :

‘He requisitioned the services of artisans from Iran, Turkey and particularly from Khurāsān (being nearer to Kashmir). He made land grants to those artisans whom he had brought from foreign countries as an incentive to boost their respective trades.’<sup>8</sup>

The Kashmiris learnt papermaking and improved upon the technique to such a degree that within a few years Kashmiri paper earned the reputation for its excellence. It acquired so much excellence that the Sultan thought it fit to be sent as a present to his contemporary kings. Never before did Kashmir witness such all-round progress as was brought about by Sultan Zainu’l-‘Abidin. Contemporary rulers used to exchange presents with him as a matter of political expediency. Sultan Maḥmūd Begarha of Gujarat and Sultan Abū Sa‘īd of Khurāsān sent some presents to Sultan Zainu’l-‘Abidin who reciprocated by sending Kashmiri products and curios to the two rulers. The most prominent present was the Kashmiri paper. Paper was already being made at Khurāsān and was not a unique thing. Hence, it follows that Kashmiri paper was far more superior to the Khurāsānī one, that is why it was sent as a present to Sultan Abū Sa‘īd.

According to *Farīshṭa* :

‘Sultan Abū Sa‘īd sent fine Arab horses and strong camels of good breed as presents to Sultan Zainu’l-‘Abidin. Pleased with this act of courtesy, Sultan Zainu’l-‘Abidin, in return, sent saffron, paper, musk, perfumes, rose-water, vinegar, elegant shawls, glass bowls and other fine products of Kashmir industry.’<sup>9</sup>

Kashmiri paper was in much demand in the rest of the country for manuscripts and was used by all who wished to impart dignity to their correspondence. The pulp from which the paper was made was a mixture of rags and hemp fibre, obtained by pounding these materials. Lime and some kind of soda were used to whiten the pulp. The pulp was then placed in the stone troughs or baths and mixed with water. From this mixture a layer of the pulp was extracted on a light frame of reeds. This layer was the paper which was pressed and dried in the sun. Next it was polished with pumice-stone and its surface was glazed with rice-water. A final polishing with

onyx stone was given, and the paper was ready for use. Its main qualities lay in its stoutness and durability.

With the rapid diffusion of its technical know-how and the ever-increasing demand for paper as a writing material, papermaking concerns were soon established in other parts of the country. These centres in medieval India were Sialkot in Punjab; Zafarabad town in Jaunpur district, Oudh; Bihar town in Azimabad (Patna) district and Arwal town in Gaya district in Bihar; Murshidabad and Hooghly in Bengal; Ahmedabad, Khambayat and Patan in Gujarat; Aurangabad and Mysore in the South.

Punjab had its full share in the development of the paper industry. Sialkot alone had a number of papermaking concerns where different varieties of paper of different brands were prepared. Sialkoti paper was white in colour and very stout. It was used throughout Punjab. Sialkot was perhaps the only papermaking centre in Punjab in medieval times.

The very appellations of the brands of Sialkot paper clearly suggest that papermaking concerns were established during, or shortly before, the reign of Jehangir (A.D. 1605-1627). Writing about Sialkot, Sujan Rai observes:

‘The paper produced here is fine; “Mān Singhī”, “Nīm Ḥarīrī” and “Khāṣah-i Jahāngīrī” brands are especially fine, white, clean and stout.’<sup>10</sup>

Raja Man Singh was one of the most trustworthy nobles of the Mughals. Most probably the ‘Mān Singhī’ brand of paper was named after him. Similarly the ‘Khāṣah-i Jahāngīrī’ brand must have owed its origin to the name of that Mughal prince. Details of the qualities of these brands are wanting but both of these brands must have qualities of a high order. As for ‘Nīm Ḥarīrī’ brand, perhaps it had cotton and silk for its ingredients blended together and must have been soft, glossy and strong.

Zafarabad is a famous town in the Jaunpur district in U.P. It was once the seat of government during the early period of the Sharqi dynasty. It was also known as ‘Kāghdī Shahr’ (paper city). It once produced a very fine, glossy and strong variety of bamboo paper. Generally two varieties of paper were produced here, namely the polished one which was exceedingly glossy and the other unpolished. The former variety was used for composition and transcription of books and was somewhat brownish white in colour. Business accounts were also maintained on this paper till the beginning of this century. Unpolished paper was a bit thicker than the polished one. Silk merchants of Banaras used the coarse variety as wrappers for their wares. There is even today a quarter in the Zafarabad town known as ‘Kāghdī Mohallah’. Zafarabad supplied paper to other parts of the province in large quantities.

Bihar had two major papermaking centres in medieval times, namely

Arwal town in Gaya district and Bihar town in Azimabad (Patna) district. Ghulam Husain Khan Tiba Tibai states:

‘Arwal and Bihar towns supplied fine paper which is still manufactured here. Investment of some capital coupled with more efficiency may well produce still finer paper.’<sup>11</sup>

Bihar town produced large quantities of paper which were supplied to other parts of the province through the commercial markets of Azimabad. As in Zafarabad town in Jaunpur district, there is also a quarter in the Bihar town known as ‘Kāghdī Mohallah’ and its residents are called ‘Kāghdī’. Writing about the province of Bihar, Sujan Rai has a fleeting praise for the paper made at Bihar town, Azimabad:

‘The paper made here is fine.’<sup>12</sup>

Beyond this no details about its quality are given. Arwal town had numerous papermaking concerns. After the occupation of Bihar, the East India Company entered into a contract with the people of Arwal for the supply of paper.

In Bengal, Murshidabad and Hooghly were the major papermaking centres in medieval times. At a later period Dinajpur also started manufacturing paper. Dr. Buchanan in his survey of the provinces of Bengal and Bihar has given an account of the manufacture of paper from *pāt* or jute (*Corchorus olitorious*) at Dinajpur and in Bihar from *sun* (*Crotalaria juncea*).<sup>13</sup>

It appears that Gujarat was by far the largest producer of paper. After meeting its own needs, it supplied paper to the rest of the country and exported a considerable quantity to West Asian countries and Turkey. Ahmedabad, the capital of Gujarat, was founded early in the fifteenth century and in less than half a century it developed with rapid strides. Sultan Mahmud Begarha was particularly keen about its progress. Scholars, divines and artisans, etc., assembled at his court in large number. Papermaking concerns were established at Ahmedabad right from the beginning. Besides Ahmedabad, large papermaking concerns sprang also at Khambayat and Patan. Paper made at Patan was known by the appellation, ‘Patani’ paper. A manuscript on the history of Bengal presented in the Junagarh Public Library is written on Patani paper. Ahmedabad was the largest papermaking centre. Paper was produced there in such a large quantity that besides meeting the needs of the country it was exported to far-off countries. It was exceedingly white and glossy. In no other part of the country paper of such a high grade was made. Paper of all size and description, thick and thin, was produced. Coloured paper of various kinds was also made. To cater for the needs of the business community brown paper was also produced for account books. The paper having the glamorous appellation, ‘Zarafshān’, was also made at Ahmedabad.

There are some manuscripts preserved in the Pir Muhammad Shah Library at Ahmedabad which are written on the 'Zarafshān' variety of paper. The salient feature of Ahmedabadi paper is its extreme whiteness and glossiness. The author of *Mirat-i Ahmadi* states:

'Although Daulatabadi and Kashmiri papers are of fine quality, yet in point of whiteness and lustre the two varieties cannot compete with Ahmedabadi paper. Several kinds are prepared.'<sup>14</sup>

However, one defect crept in Ahmedabadi paper. During the process of manufacture imperceptible perforations were caused in the sheets of paper. This was because of the physical features of Ahmedabad. The author of *Mirat-i Ahmadi* thus explains:

'As this city is situated in the desert, particles of dust are unavoidably mixed with the pulp. They come out of the paper sheets when they are dried and polished leaving behind imperceptible perforations. This is a defect.'<sup>15</sup>

Despite this defect, Ahmedabadi paper was in great demand both at home and abroad simply because of its whiteness, elegance and glossiness. It was exported to Arab countries and Turkey and merchants made huge profits through its export to those countries. The same author remarks elsewhere:

'Because of the whiteness of its colour, Ahmedabadi paper was exported every year by the merchants to India, Arab countries and Turkey worth tens of thousands of rupees like currency notes.'<sup>16</sup>

During the Mughal period Daulatabad, with Aurangabad as its capital, emerged as an important papermaking centre. The most noticeable feature of Daulatabadi paper was its durability and glossiness. There were numerous papermaking concerns in Daulatabad where different varieties of paper known by different appellations were produced. Daulatabad was the chief supplying centre of paper to South India.

The town of Balapur in Akola district, Barar, was also a paper-producing centre in medieval times and continued to be so for a long time. Some four or five kinds of paper of different hues and colour were made at Balapur. There is even today a quarter by the name of 'Kāghadpura' where ruins of vats, employed for making paper, are still to be seen.

A papermaking concern was established at Mysore during the reign of Sultan Tipu. Grains of gold leaf were mixed in the pulp and by this device gold became spread over the surface of the paper.<sup>17</sup> This special kind of paper was meant for royal use, as may be seen in the private account books of Peshwa Bajee Rao whose folios are similarly treated.

The technique of papermaking was more or less the same throughout the country differing, of course, only in the preparation of pulp from different

materials. The skill of the Indian artisan streamlined the product to greater excellence. Generally the rags were thoroughly cleansed, boiled and beaten into a pulp with water to the consistency of cream. A finely woven wire sieve was dipped into the vat (*daba*). A horizontal shaking motion was given to the sieve, which caused the fibres to felt or interlock, the water draining away through the fine holes in the sieve. The sheet was then placed between felt and subjected to pressure. After drying, the paper was dipped in size (*mandi*) (to render it non-porous) and finally dried and smoothed by passing it through rollers under pressure. To size the paper and render it fit for ink, a glue, somewhat gelatinous, was first prepared over the vessel in which this mixture was—a rod was to be laid and a cleft stick was used for holding the sheet of paper during the process of dipping. As soon as the paper had been sufficiently saturated, it was withdrawn by gently rolling it round the stick which had been laid over the vessel. The sheet of paper was afterwards hung to dry. It was then smoothed and polished by being rubbed on wood with the convex side of a chauk shell. Jute, *sunm*, Ambaree, Moorve, old sacks and fishing-nets were also employed. Dr. Forbs Royle observes that the fibrous parts of many lily and aloe-leaved plants have been converted into excellent paper in India, where the fibres of tiliaceous, malvaceous and leguminous plants are employed for the same purpose.<sup>18</sup> Paper was used to be made also from the *Sanseviera* in Trichinopoly. Some has been made at Madras of the unbleached *Agave* alone, as also mixed with the old gunny-bags.<sup>19</sup>

Several types of paper were made with varying degrees of excellence and for a variety of uses. Among the most reputed brands of paper were the 'Zarafshān' variety of Ahmedabad, Mān Singhī, Nīm Ḥarīri and *Khāshah-i Jahāngīrī* of Sialkot; Bahādur *Khānī*, Ṣāhib *Khānī*, Murād *Shāhī*, *Sharbatī*, Qāsīm Begī and Rū ba-karī of Aurangabad. Most of these varieties of paper are admirably preserved in the Habibganj Section of Maulana Azad Library, Aligarh.

*Ahmedabadi*: Several types of paper were made with varying degrees of thickness. Some of these were fine and superfine. The 'Zarafshān' variety was golden coloured. The salient feature of Ahmedabadi paper was its extra whiteness and glossiness. The Habibganj specimen is a bit thick and not very white. It may have lost much of its whiteness due to passage of time.

*Kashmiri*: Kashmiri paper was stout and glazed. Some papermaking concerns turned out superfine paper which was commonly called 'silken paper' because of its being soft, thin and glossy. Quite a few MSS. preserved in Habibganj are on silken paper which is thin and pale green.



Khāshah-i-

*Jahāngīrī*: This was exclusively made at Sialkot. The Habibganj specimen is glossy, thin, polished and bluish white. Another specimen is pale grey.

*Hyderabadī*: There were two quarters in Hyderabad where paper was made, namely Mohallah Miyan *Mushk* and the other Kāghdī Gorha. Some seven specimens are preserved in Habibganj which were produced during the reign of Qutub Shahi rulers. Some are polished and of brown colour with very fine shades of difference.

*Faizabadi*: The Habibganj specimen suggests that Faizabad was also a papermaking centre. The unpolished one is of medium quality and is pale yellow. The polished one is dark yellow.

*Kanpuri*: It was prepared from bamboo and greyish in colour.

*Aurangabadi*: There were numerous papermaking concerns at Aurangabad which turned out numerous varieties of paper. Generally Aurangabadi paper was glossy and stout. The notable varieties of this paper were:

- (1) *Bahādur Khānī*.—It appears that this variety was produced after Bahadur Shah of Gujarat (A.D. 1526–1537) had occupied Daulatabad. He is believed to have branded this variety as Bahādur Khānī just as a particular kind of cloth and a gun are named after him. This variety of paper is of medium quality and somewhat thick but stout and durable.
- (2) *Shāhib Khānī*.—This variety was also produced at Aurangabad. It is thick and of medium quality.
- (3) *Murād Shāhī*.—The Habibganj specimen is somewhat thick but all the same is fine. It was named after prince Murad, Akbar's second son, during his stay in the Deccan.
- (4) *Sharbatī*.—This variety is also thick and fine and differs from No. 3 in that it is pale green.
- (5) *Qāsim Begī*.—The Habibganj specimen is light red. This variety was made in varying grades of thickness but invariably of red colour.
- (6) *Rū ba-kārī*.—This variety was made in four or five different grades and was chiefly consumed in offices.

*Balapuri*: Balapur was also a papermaking centre in medieval times. Some four or five varieties of different colours were turned out by papermaking concerns ranging from brown through ordinary white to extra white. However, it was not so glossy as that produced in Ahmedabad.

In course of time the country was dotted with a large number of other minor papermaking centres.

Māler-Kotla<sup>20</sup> was once a flourishing paper-manufacturing centre down to the first quarter of the present century and so was Multan.

Sanganer<sup>21</sup> (in Jaipur, Rajasthan) was once famous for its dyed and stamped chintzes. Country paper is still manufactured here.

Kotah<sup>22</sup> (Rajasthan) has muslins, both white and coloured, and a little country paper as its principal manufactures.

Tijarah<sup>23</sup> (in Alwar, Rajasthan) has weaving and papermaking as its principal industries.

There was formerly a small manufacture of country paper at Kannuaj<sup>24</sup> (in Farrukhabad, U.P.).

A special paper used for native account books is made at Mathura.<sup>25</sup>

Kalpi and Pukharayan in Kanpur district have long been well known for handmade paper. In addition to these two centres there have also been handmade paper units in Kanpur, Lucknow, Allahabad, Faizabad, Rampur, Almora, Moradabad, Mathura, Dehra Dun and Sultanpur.

A small quantity of handmade paper is produced at Hariharganj<sup>26</sup> (in Shahabad district, Bihar).

The country paper industry at Kalita<sup>27</sup> (in Pabna district, now in East Pakistan) has almost 'died out, killed by competition with the Bally and other paper-mills'.

At Panchamnagar<sup>28</sup> (in Damoh district, M.P.) native paper manufactured by the industry has greatly declined. The paper is used by money-lenders for their account books.

The paper and cloth of Dharangaon<sup>29</sup> (in the East Khandesh district, Maharashtra) were formerly held in esteem. At present the manufacture of paper has entirely ceased.

Erandel<sup>30</sup> town (also in the East Khandesh district, Maharashtra) is a place of some antiquity and was formerly celebrated for its manufacture of coarse native paper, an industry which still survives to a limited extent.

At Poona<sup>31</sup> the manufacture of paper by hand, formerly of some importance, has of late years greatly declined. Papermaking is said to have been brought to Poona from Junnar. According to the paper-workers the site on which they built their houses and factories was given free of charge by the Peshwa to encourage the craft. Of 40 factories only eight remained, seven

in Poona and one at Bhamburda just across the Mutha from Kagdipura. The paper made at Poona was strong and lasting but had no special peculiarity or excellence. Unlike the practice at Nasik and Junnar where rags were used, at Poona paper was made solely from waste paper. Six chief tools and appliances were used. First, the *dhegi* or great hammer, a long heavy beam poised on a central fulcrum worked in a long pit two or three feet deep. The head of the hammer was a heavy block of wood fixed at right angles to one end of the main beam, with its face strengthened by four thick, polished steel plates. On the upper surface of the other end of the main beam two or three steps were cut and the hammer was worked by three or four men together forcing down the beam and letting it rise by alternately stepping on the beam and on the edge of the hole. Secondly, a screen or *chhapri* made of the stalks of the white conical headed amaranth, *Amaranthus globulus*, on which the film of paper rested when the frame was brought out of the cistern and the water allowed to pass through it. Thirdly, a rectangular teakwood frame or *sacha*, two and a half feet by two, with eight cross-bars. Fourthly, a soft date-palm brush or *kuncha* used in spreading the sheets against the cemented walls of the room. This brush was not always required as the paper was generally spread in the sun on rags. Fifthly, a piece of agate as polishing-stone. Large shells, *Cyproea tigris*, were also employed instead of polishing-stones. Sixthly, smooth teakwood boards, each about two feet by three, were required to lay the paper on which it was being rubbed with the polishing-stone or shell. The process of making paper from waste paper was not so elaborate as the process of making it from sacking. The waste paper was torn to pieces, sorted according to colour, moistened with water, taken to the river and pounded with stones and washed for three days. It was then taken to the cistern which was a cement-lined tank about seven feet by four feet and four feet deep half filled with water. The pulp was thrown into this cistern. When it was thoroughly dissolved the workman sitting at the side of the pit, bending over the water, took in both hands the square frame which held the screen serving as a sieve, passed it under the water and drew it slowly and evenly to the surface, working it so that, as the water passed through, a uniform film of pulp was left on the screen. The screen was then lifted up and turned over, and the film of paper was spread on a rag cushion. When layers had been heaped on this cushion, nine to fourteen inches high, a rag was spread over them and on the rag was laid a plank weighted with heavy stones. When this pressure had drained the paper of some of its moisture the stones were taken away and two men, one standing at each end of the plank, seesaw over the bundle of paper. When it was well pressed the paper was peeled off, layer after layer, and spread to dry either on the cemented walls of the building or on rags laid in the sun. When dried, each sheet was laid on the polished wooden board and rubbed with a shell till it shone. The paper made by this process, though

rough and of a dingy yellow, was strong and lasting and was highly prized by the merchants who used it for their account books. In sharp contrast to the cheaper machine-made imported paper, the demand for the local paper declined.

Paper<sup>32</sup> was made at Dharwar, Gadag, Gutal, Hubli, Karajgi, Navalgaud, Ranebeunur and several other places in Dharwar till the sixth decade of the nineteenth century. Since then the craft has almost died away under the competition of better and cheaper imported machine-made paper.

Papermaking,<sup>33</sup> introduced about A.D. 1800 in Nasik, was once important and prosperous but has now fallen into decay. The paper was made from rotten gunny-bags and rags. In making it into paper the rags passed through the following 13 elaborate processes:

(1) It was cut into small pieces, moistened with water and pounded by a heavy fixed hammer, *dhegi*.

(2) It was washed in plain water.

(3) It was moistened with slaked lime and left in a heap on the floor for seven or eight days, then pounded again, heaped and left to lie for four days more.

(4) It was washed a second time in water.

(5) It was mixed with *khar* (impure carbonate of soda), in the proportion one part soda to 32 parts of the rags, pounded and kept for one night.

(6) It was then washed a third time.

(7) It was a second time mixed with *khar* in the proportion of one part of it to 40 parts of the pulp, dried in the sun to bleach it and pounded three or four times.

(8) It was a fourth time kept in water for a night and washed the next morning.

(9) It was mixed with country soap in the proportion of about one part of the soap to every 27 parts of the pulp, pounded and dried.

(10) It was washed a fifth time.

(11) It was then thrown into a cement-lined cistern, about seven feet by four feet and four feet deep, half filled with water and, when thoroughly loosened and spread through the water, the workmen at the side of the pit leaned over the water and took in both hands a square-cornered screen or sieve, passed it under the water and drew it slowly and evenly to the surface, working it so that, as the water passed through, a uniform pulp was left on the screen.

(12) The screen was lifted up and turned over and the film of the paper was spread on a rag cushion; when layers had been heaped on this cushion to the height of from nine to fourteen inches, a rag was spread over them; on the rag a plank weighted with heavy stones was laid. When the pressure

had drained the paper of some of its moisture the stones were removed. Two men, one standing at each end of the plank, then proceeded to seesaw over the bundle of the paper; when it was well pressed the paper was peeled off, layer after layer, and spread to dry on the cemented walls of the building.

(13) When dry each sheet of paper was laid on a polished wooden board and rubbed with a smooth stone till it shone. Here, again, the four chief tools and appliances used were: (1) the *dhegi*, a large hammer, (2) *sacha*, a rectangle teakwood frame, two and a half feet by two, and with eight cross-bars, (3) *chhapri*, a screen made of the stalks of the white conical-headed amaranth, *Amaranthus globulus*, and (4) *kuncha*, a soft date-palm brush. The paper made at Nasik, though rough and dingy yellow in colour, was strong and durable.

Rough<sup>34</sup> white paper, called Bagalkot paper, was made in Bagalkot, Maharashtra. The method of making paper was more or less similar to that employed at Poona and Nasik. Here rags, coarse cloth or *gunny pāts* were employed as raw material to make pulp. These were cut into pieces about four inches long. These pieces were soaked in water, laid in a stone receptacle and carefully pounded with a heavy wooden pestle or *langar*. They were then rolled into a large ball which was washed in a river. Next day the ball was soaked in lime-water and was again pounded and rolled into a ball after allowing it to lie for four days on the floor; the ball was again soaked in water. It was mixed with a solution of water and pounded powder of *papadkhar* (impure carbonate of soda) with equal quantity of *savala*. After washing it four times, the mixture was dipped for one day in a cement-lined cistern in which the ball dissolved and covered the water with a thick yellowish film. Next day the mixture was gently stirred till the whole contents of the cistern were charged with tiny films of paper. The workmen took a flat sieve or strainer called *sacha* varying in size according to the size of the paper but usually about 18 inches square. It was surrounded by a plain wooden frame into which were lightly fastened a number of hair-like threads of bamboo fibre laid close together. Holding the strainer in both hands the worker lay by the side of the cistern and dipped the strainer about a foot under water. He took care to keep it level and brought it slowly to the surface catching the floating films. Thus when it reached the surface, it formed an even layer over the whole strainer. He held it to dry for a few moments and then upset the layer of paper on the floor. This process was repeated and the layers were heaped one on the other till the heap was about nine inches thick. The heaps were then pressed under a wooden plank on which two men stood and the water was squeezed out. Each sheet of paper was separated, pasted to the walls and after a short time hung on the ropes to dry. When thoroughly dried the sheets were softened by rubbing both sides with rice paste. When dry they were piled in packages, 20 sheets each. Each

package had one sheet soaked in water and this, kept under pressure for a day, moistened the whole package. Each sheet was then laid on a smooth plank and rubbed with a soft stone till it shone. It was then ready for use. The Bagalkot paper was largely used for traders account books.

Kolhapur<sup>35</sup> has also been a centre of handmade paper. The paper made at Kolhapur was coarse but strong and glazed. Sacking which was the chief raw material was brought from Belgaum, Kagnoli and other places. About 96 pounds of sacking were cut into small pieces and left in lime-water for a night. It was then reduced to a pulp in the *dang* which consisted of a heavy wooden lever with a heavy wooden pestle. The lever was fixed by axles on two upright posts driven into the ground. At the end of the pestle nearest the ground two heavy iron-teeth were fixed, each weighing about ten pounds, the whole weight of the pestle being about 50 pounds. The object of this apparatus was to pound the fibrous material into a pulp to effect which two men were employed in alternately raising the pestle and allowing it to fall with a heavy blow on a stone slab, two and a half feet square, firmly fixed in the ground with a terraced floor round it. Three men were employed to work the *dang*, two at the lever and one to keep the sacking between the stone and the pestle. Fourteen days were required to reduce 96 pounds of sacking into a coarse pulp. The pulp was then washed in a river or pond, by placing about 12 pounds in a piece of *daugri* (coarse cloth) gathered at the corners and tied to the waists of two men. These men stood in the water up to the waist and by continually stirring the pulp brought all dirt and impurities to the surface and carefully removed them. To wash 96 pounds of pulp took three hours. The pulp was then brought to the land and the water was allowed to drain off, after which about half pound of carbonate of soda or *papadkhar* and two pounds of lime were added. It was again pounded in the *dang* for three days for about 10 hours each time after which it was again washed and two pounds of country soap and two pounds of lime were added. Four men were then employed to tread the pulp on a terraced floor for several hours. It was then made into large lumps and left for four days to bleach and putrefy, and on the fifth day it was again for the third time put into the *dang* which it left that time in the shape of a thin pulp. The bleached and putrid mass was then put into a line cistern filled with water, four feet square and four feet deep. The mass was stirred with a bamboo and the process of papermaking began. The gelatinous mass was received on a mould called *khasi* which consisted of a wooden frame, three feet long, two and a half feet broad and one and a half inches deep, with cross wooden bars at intervals of three inches. Over this frame was placed a matting called a *chhapri* made from the blades of *kavas* grass woven with horsehair. Over this matting another thin frame of wood was fitted close to the mould. This second frame was used in order to keep the stuff on the mould and to limit

the size of the sheet. A man sat with the mould in both hands on the edge of the cistern and, inclining the mould a little towards it, dipped it into and lifted the mould again horizontally mildly shaking it to distribute the stuff over it. This was repeated three or four times until a sufficient quantity of the pulp settled on the mould. The matting was then taken off the mould and placed on a terraced floor called *baksar*. On depositing it on the *baksar* the side on which the paper was formed was turned towards the floor and pressed with hand to squeeze out the water, after which the matting was carefully taken up and the sheet of paper remained deposited on the floor. Sheet after sheet was then taken off and laid one over the other in a pile, until the pulp in the cistern was exhausted. The pile was then introduced between two stout boards, over which a couple of heavy stones were placed and a man kept stamping on the board with his foot to squeeze out the superfluous water. The sheets were then carefully separated one by one and dried on the house walls which had been washed with white earth and water. As the water was absorbed the paper dried and fell to the ground. At this stage the crude paper was called *rast*. It was again hung in the sun for a short time to dry. After being so dried, the sheets were piled and pressed with great force to render them flat and smooth. The paper then required finishing by being sized and polished for which rice gruel mixed with powdered *turti* or alum was used. This was applied on both sides of the paper with a brush and allowed to dry in the sun on a rope. It was then polished by placing it sheet by sheet on an even board drawing over it smartly a smooth flint stone or shell until it was glazed. It was then cut and the edges were made even. Three varieties of paper were prepared, namely the *vahicha* which was used for books; the *kharchi* for ordinary use and *rast* used as wrappers. The last variety was of a superior grade and was available in a size of 18 inches long and 12 inches broad. The *kharchi* paper was a little inferior and was sold in a size of 14 inches long and 12 inches broad. Papermaking at Kolhapur, as elsewhere, declined chiefly owing to import of better and cheaper paper.

Paper is manufactured to some extent in Satara<sup>36</sup> district (in Maharashtra).

Gokak<sup>37</sup> town (in the Belgaum district) was once famous for its dyers and is still noted for a coarse kind of paper made in large quantities.

Coarse paper is made at Koratla<sup>38</sup> (in the Karimnagar district, A.P.) and is used by the *patwaris* for their village account books.

Coarse paper is also made in Mujahidpet<sup>39</sup> (in the Nander district, A.P.).

Sembiem<sup>40</sup> town (in the Chingleput district, Madras) contains ten small papermaking establishments.

The ever-increasing demand for paper for a variety of uses made it of the most important consumer goods. The handmade paper industry flourished

for a considerable time. However, with the arrival of cheap machine-made paper in the market, it has lost ground. At some places the industry is now almost extinct and yet at other places it is simply lingering. It is gratifying to note that a revival of this industry is being made at government level. In pursuance of this policy the Maharashtra State government has instituted technical training courses in the handmade paper industry under the aegis of khadi and village industries commission. According to the available statistics the handmade paper industry made considerable progress in Uttar Pradesh during 1963-64. The number of co-operative societies engaged in the trade rose from 25 to 40 at 23 production centres. According to the State khadi and village industries board, over 5.5 lakh kg. of paper, valued at about Rs.6 lakh, was produced at 20 centres during the year. The principal products are university degree paper, high-grade paper and watermark paper.

The handmade paper industry has still some employment potential and can absorb a fairly large number of unemployed persons.

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